

Peabody, Daniel (EGLE)

From: Peabody, Daniel (DEQ)
Sent: Thursday, April 11, 2019 8:39 PM
To: Saric, James
Cc: Keiser, Jeff/MKE; Roth, Charles; Canar, John; Patricia.White@jacobs.com; Gustavson, Karl; Roberts, Keegan; John Kern; Kirchner, Scott; Bennett, Brian
Subject: MDEQ Comments on Area 6 Surface Water Work Plan
Attachments: MDEQ Comments_Kalamazoo River_OU5 Area 6_Surface Water Work Plan 03292019.pdf

Jim,

Attached are the comments from the MDEQ on the Area 6 SWWP. I attached all of our comments on the document but inserted what I feel are the big picture comments below. It is a little hard to distinguish between what is should be sorted out “pre-deployment” vs. what can wait to be revised in the document, since the State believes the study rationale, objectives, and explaining the data analysis, handling and limitations is as (or more) important than comments/concerns that pertain to the physical installation of the equipment. Comments highlighted below are also highlighted in the document for quick reference. I will draft a cover letter tomorrow for the official comment submittal but wanted to get these into your hands tonight so you could get what you feel are “key” comments to Wood ASAP. Please add or subtract from the highlighted comments as you see fit. I believe the Trust may also provide some comments on the Work Plan, but I will need to circle back with the technical folks to see if they had time to review it. Either way, I don’t think their comments will drastically change the draft that is attached.

Commenting Organization: MDEQ Commenter:

General Comment #1: The Surface Water Work Plan (Work Plan) appears to have been drafted in a vacuum in that it fails to incorporate data and conclusions from previous relevant studies, and ignores discussions that took place at the Area 6 Work Group meeting held on March 14, 2019, and comments provided by the USEPA and the MDEQ on the Kalamazoo Area 6 Monitored Natural Recovery Preliminary Sampling Plan, dated June 22, 2018.

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General Comment #2: A Final Report for work completed under the 2018 Monitored Natural Recovery (MNR) Preliminary Sampling Plan was not submitted. By itself, the Work Plan does not adequately present and summarize findings from the preliminary work conducted in 2018 and provides mostly subjective summaries of results. This includes but is not limited to the interpretation of geochronological data to determine estimated net sedimentation rates, the range and interpretation of pore water results, and the comparison of PCB profiles in 2018 and historic, co-located sediment cores.

Commenting Organization: MDEQ Commenter:

General Comment #7: The document is entitled Surface Water Work Plan, yet the stated purpose of the work study is to provide a baseline for future comparisons in Area 6. It is the DEQs position that the LTMP, which has been ongoing for nearly 20 years, provides the baseline to which future comparisons should be made. Because natural recovery rates are generally slow, and because PCB concentrations within a given monitoring year are variable, the DEQ is concerned that reliance on unproven technology with no historic record for baseline comparisons may delay future decision making with regard to the efficacy of natural recovery as a valid remedial option. While DEQ anticipates that data from the hydrodynamic and optical sensors will provide information useful for interpreting direct measures of water column PCBs, DEQ does not endorse reliance on these indirect measures of water column PCBs for baseline comparisons intended to infer change, or rates of change in PCBs in water or sediment.

Commenting Organization: MDEQ Commenter:

General Comment #11: The Work Plan includes the installation of four Hydrodynamic and Sediment Transport (HyST) Systems (2 in Area 5 and 2 in Area 6) and two Optically-based In-Situ Characterization Systems (OPTICS) (1 in Area 5 and 1 in Area 6). The Work Plan should discuss how the limited coverage of these real-time devices inform our understanding of the larger system and how the areal extent of the data collected will be determined (i.e. does data collected at the 1 OPTICS system location in Area 6 represent the entire lake, including other “sections”?).

Commenting Organization: MDEQ Commenter:

General Comment #13: As alluded to in the text, the OPTICS system may be more reliable in systems with significant and systematic short-term temporal variations in TSS and contaminant concentrations. One such example is Berry’s Creek which sees TSS and contaminant concentrations varying over intra-tidal time-scales (~6 hrs). Both vary as a function of hydrodynamic forcings (the tide), and contaminant concentrations are well correlated to TSS. Review of LTM data shows poor correlation of TSS or PCB with hydrodynamic forcings (river flow rate), and poor correlation between PCB and TSS. Therefore, and as also indicated in the text, the success of the OPTICS system is not guaranteed. Therefore, it may be more appropriate to consider implementing a short-term pilot study using this instrumentation suite in order to determine its utility for long-term and area-wide application.

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General Comment #14: A review of the Work Plan shows the fraction of the water column to be measured by the acoustic doppler current profilers (ADCPs) (for currents) is as low as 17% and less than 50% at 4 of 6 locations. This limits the utility of the data to establish sediment and PCB fluxes.

Commenting Organization: MDEQ Commenter:

General Comment #15: Although the anticipated statistical analyses were not described in the Work Plan, it is safe to assume that some form of multiple regression model, or other multivariable predictive method will be required to predict water column PCBs from indirect indices developed from the Optical sensors. There is a broad literature on statistical methods for developing empirical multivariable models and the common pitfalls. The primary problem that is encountered is one of overfitting the data to a selected empirical model. Overfitting is the situation where modeled values match measurements well, but do not predict outside the training data, specifically where prediction is needed—after all no prediction is required for points in time and space where PCBs are measured. Problems of overfitting are the most severe when sample sizes are small, and the number of covariates is large. The best way to understand the quality of a predictive model is to validate the fitted model on an independent set of paired measurements. The Work Plan makes no mention of model fitting techniques nor how the predictive model will be validated. The MDEQ suggests that the Work Plan should include detailed description of how models are to be fit to the resulting data, the level of accuracy and precision that is expected and the sampling design for collection and statistical evaluation of independent validation data.

Commenting Organization: MDEQ Commenter:

General Comment #16: The correlation procedures to be used with the OPTICS analytes is not clear. It is not clear what parameters measured by the OPTICS system will be correlated to what analytes (total, dissolved, or particulate PCBs). It is not clear if the PCB time-series potentially resulting from the OPTICS measurements reflects dissolved, particulate, or total PCBs.

Commenting Organization: MDEQ Commenter:

General Comment #17: The Work Plan references a “power analysis” and reports power as a function of sample size and covariance but fails to describe what statistical test the power curves correspond to. Assuming a particular test is identified, other key parameters of the power analysis must also be described. These would include the assumed statistical distributions of the PCBs and indirect measures, the effect size under consideration for the as yet un-named statistical test. Further, if the power analysis is related to temporal comparisons between predicted PCBs at multiple points in time and or space, these study design parameters must also be selected and reported as part of the power analysis.

Commenting Organization: MDEQ Commenter:

General Comment #18: The document needs to clearly indicate how data generated under this new program will be used. What analyses are anticipated? What hypotheses will be tested and what statistical analyses are anticipated? The sensors will generate extensive time series which generally require specialized statistical methods for making comparisons and extrapolation in time and space. The work plan should provide an overview of what analyses are anticipated and provide appropriate references to the published literature. In particular the work plan discusses correlating water column PCBs with indirect indices of water quality but neglects to discuss how these correlations will be evaluated, the anticipated accuracy and precision of these relationships and also fails to justify the numbers of water column samples for this work.

Commenting Organization: MDEQ Commenter:

General Comment #19: The work plan should separately identify specific objectives and corresponding statistical analyses expected to be conducted and evidence that the numbers of samples and locations is adequate to satisfy identified statistical objectives.

Commenting Organization: MDEQ Commenter:

Section: 1.0 Page #: 1-1 Lines #:

Specific Comment #1: The Work Plan will not establish “baseline conditions” in Lake Allegan, as described in the text. Baseline conditions in Lake Allegan have already been established through the collection of data under the Long-Term Monitoring Program (LTMP), as well as additional Area-specific studies (e.g. Lake Allegan Inlet-Outlet Study, etc.), which has been ongoing since 1999. The proposed surface water sample program will measure “pre- and inter-deployment conditions” for the OPTICS and HyST systems, but the Work Plan should utilize conclusions and findings from previous investigations, produce data to *supplement* the existing dataset, and it should not replace or be completed outside of LTMP activities. This reference, and all subsequent uses of the term “baseline” in the Work Plan should be removed and replaced with more appropriate text.

Commenting Organization: MDEQ Commenter:

Section: 1.3.2 Page #: 1-5 Lines #: 7-8

Specific Comment #14: The “evidence of bioturbation” should be further explained. Lake-bottom environments may be more dynamic than suggested in the text. For example, in deeper lake bodies, surficial wave action is driven by wind currents but return currents moving in an opposite direction may be present deeper in the water column.

The 2017 Area 6 Video Condition Survey Report provided to the MDEQ shows what appears to be gravitational settling (loading) or perhaps *lingoid* or *lunate ripple marks*, which would be bedform features unrelated to bioturbation, but the quality of the video is such that the identity and cause of the feature(s) cannot be determined.



19



20

In 2015, the MDEQ collected images of lake-bottom sedimentary features that appear similar to those provided in the Area 6 Video Conditions Report, in a lake (Torch Lake) that is void of carp (0 to <0.1 catch per unit effort [The Fish Community and Fishery of the Portage-Torch Lake System, Houghton County, Michigan in 2007-08, dated June 2016]) and at the exact depth referenced in the text. Those images were shared with GP via email on March 26, 2019 and are provided below.



While the identity and cause of the lake-bottom features observed in Lake Allegan is debatable the assertion that they are the result of carp feeding or other biological activities related to carp (or other bioturbating organisms) should be made with caution without additional lines of evidence to support that claim, especially if these lake-bottom features are being used to justify placement of HyST or OPTICS monitoring stations.

Commenting Organization: MDEQ Commenter:

Section: 1.4 Page #: 1-7 Lines #: 1

Specific Comment #16: Identifying causation for changes observed in “night time” data may be difficult if not impossible in a dynamic system such as the Kalamazoo River. Please explain how results from an unknown but limited number of samples, 2-3 events are proposed in the Work Plan, collected at “night time” over a period of six months will be used to “...understand effects from nighttime bioturbation or other effects”, since this is not described in this Section or other Sections of the Work Plan.

Commenting Organization: MDEQ Commenter:

Section: 1.4 Page #: 1-7 Lines #: 6

Specific Comment #18: More is known about Area 6, and the larger river system, than what is being described. Seasonal/temporal and spatial variability of PCBs, and relationships between PCBs and water column particulates, dissolved solids, river flow and other parameters and natural phenomena, have been well documented and rigorously evaluated. Baseline conditions have already been established in Lake Allegan through the collection of data under the LTMP, which has run from 1999 to present. It is more accurate to state, “the Surface Water Work Plan will establish pre- and inter-deployment conditions for the HyST and OPTICS systems.”

Commenting Organization: MDEQ Commenter:

Section: 1.4 Page #: 1-7 Lines #: 26

Specific Comment #19: Is one OPTICS system in Area 6 sufficient to detect and evaluate potential impacts to the system that can be attributed to carp?

Commenting Organization: MDEQ Commenter:

Section: 1.4 Page #: 1-11 Lines #: 26

Specific Comment #20: The benefit of undertaking such a costly monitoring effort to evaluate trends and relationships that have been documented and rigorously evaluated over multiple decades, and are well understood, should be considered and the Data Quality Objectives and Study Goals should be re-evaluated.

The Data Quality Objectives, Study Goals – Decision Problems outlined in the Work Plan, and provided below, have already been evaluated.

- What PCB concentrations are associated with sediment transported into and out of Area 6 (i.e., what PCB concentrations are present in the water column)?
- Do temporal trends in surface water PCB concentrations demonstrate a decrease?
- Are PCBs predominantly present in the particulate or dissolved phase?
- What is the temporal variability of PCB concentrations in surface water transported into and out of Area 6?

Therefore, data collected for this objective will *supplement* the existing dataset and our knowledge of ongoing processes and key correlations but will not provide information on processes that are currently not well understood.

Commenting Organization: MDEQ Commenter:

Section: 2.1 Page #: 2-1 Lines #: 15

Specific Comment #21: Please provide the rationale for selecting Bridge Road Bridge as the upstream limit for the Work Plan. The MDEQ believes the 26th Street Bridge would provide a better monitoring point for water and sediment quality flowing in to Area 5 since it marks the inlet location for Area 5 and the 26th bridge has been used as a monitoring point under the LTMP and inlet-out studies so an extensive dataset for comparison is available.

Commenting Organization: MDEQ Commenter:

Section: 2.1 Page #: 2-2 Lines #: 6

Specific Comment #22: How will a causation for temporary shifts or changes in data collected at Station 4 be developed? The Work Plan states, data at Station 4 “...will aid in the characterization of wind-driven and anthropogenic sources of resuspension and carp bioturbation”. How will wind-driven and anthropogenic sources of resuspension or carp bioturbation, or other natural phenomena, be distinguished from one another? How will the contribution or relative contribution of each source of resuspension and bioturbation be measured?

Commenting Organization: MDEQ Commenter:

Section: 3.3.2 Page #: 3-5 Lines #:

Specific Comment #24: The Work Plan should discuss how differences observed in data collected as part of the “night time” sampling effort be attributed to impacts from carp and not other phenomena? Is the number of “night time” samples, 2-3 sample events are proposed in the Work Plan, adequate to measure and characterize what are interpreted to be “bioturbation from night-time feeding activities”, as described in the text?

Commenting Organization: MDEQ Commenter:

Section: 3.3.3 Page #: 3-5 Lines #:

Specific Comment #25: The MDEQ has examined and evaluated the relationship between flow conditions and PCBs, as well as other parameters, and has conducted sampling during more than one storm event. Those data and correlations should be reviewed and incorporated into the Work Plan.

Thanks,

Daniel Peabody

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Superfund Section
Remediation and Redevelopment Division
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From: Gustavson, Karl <Gustavson.Karl@epa.gov>

Sent: Thursday, April 11, 2019 12:30 PM

To: Peabody, Daniel (DEQ) <PeabodyD@michigan.gov>; Roberts, Keegan <robertsk@cdmsmith.com>; John Kern <kernstat@gmail.com>

Cc: Saric, James <saric.james@epa.gov>

Subject: FW: Comments.

Just an FYI on my comments (below). Most also related to the lack of clarity on objectives.

Karl Gustavson
703-603-8753

From: Gustavson, Karl

Sent: Tuesday, April 09, 2019 2:17 PM

To: Saric, James <saric.james@epa.gov>

Subject: Comments.

OK, I pulled them out as below. Take or leave as you want:

1. Page 1-5 "Generally, the sediment bed in the western half of Lake Allegan was deeper (greater than 8 feet)." Should this refer to the depth of contaminants or does it really mean the depth of sediments?

2. Page 1-6. Section 1.4. This section could better position the sampling as part of the carp removal effort.

a) Consider replacing the third sentence that begins with "These data will also..." with this text:

"A carp population management program is also being considered for Area 6. Carp removal is hypothesized to result in changes in lakewide water quality parameters, in particular water clarity and the amount and type of suspended particulates. Data collected under this Work Plan would serve as the pre-removal (baseline) data for an analysis of the impact of the carp control effort. This baseline of surface water quality and PCB concentrations can be used in

conjunction with long-term monitoring data to evaluate the effect of the carp removal on PCB concentrations in the water column and rates of natural recovery.”

b) The last sentence needed more context prior to naming the approaches.

“Surface water sampling results and data collected from the in-situ water quality monitoring platforms (the HyST system and Optics, described in greater detail later) will be used to develop and refine a provisional conceptual site model.”

3. Page 1-8. “The impact of carp on sediment resuspension/bioturbation in Lake Allegan.” This section could also further elaborate on data use. Consider replacing with this paragraph:

“The impact of carp on sediment resuspension/bioturbation in Lake Allegan – The process level question regarding the impacts of carp has several aspects – (1) whether carp are responsible for sediment resuspension and decreased lake clarity; (2) whether that resuspension results in the ‘upward mixing’ of PCBs in sediment at a rate and extent that would limit the potential application of MNR as a remedy; and (3) whether carp removal changes sediment and PCB cycling in the system and the rate of natural recovery. It will be important to understand the degree and spatial extent (x, y, and z) of sediment resuspension (at the OPTICS stations) to allow evaluation of the significance of carp foraging/bio-mixing as a limitation on MNR potential.”

Page 3-3, last sentence, “If a correlation between the optic package...”:

The parameters by themselves have value even if the PCB concentrations between grab sample events are not reliably estimated. Modify the sentence to read: “If a correlation between the optic package results and the PCB surface water concentrations is not apparent during an interim evaluation, the calibration effort may be discontinued.”

4. Page 3-5, Section 3.3.2: “The video condition survey indicated that carp are present,...” It seemed obvious that carp are present. Consider this modification:

“The video condition survey suggested a high degree of carp bioturbation occurring within the Kalamazoo River...”

Karl Gustavson
703-603-8753

**Kalamazoo River Superfund Site
Area 6 Surface Water Work Plan
March 29, 2019**

GENERAL COMMENTS

Commenting Organization: MDEQ

Commenter:

General Comment #1: The Surface Water Work Plan (Work Plan) appears to have been drafted in a vacuum in that it fails to incorporate data and conclusions from previous relevant studies, and ignores discussions that took place at the Area 6 Work Group meeting held on March 14, 2019, and comments provided by the USEPA and the MDEQ on the Kalamazoo Area 6 Monitored Natural Recovery Preliminary Sampling Plan, dated June 22, 2018.

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Commenting Organization: MDEQ

Commenter:

General Comment #3: Language in the Work Plan suggest only “clean” sediments currently flow into Lake Allegan, which is not supported by Site data. Furthermore, future remedial actions completed in upstream areas will result in the release of contaminated materials that will likely deposit in Lake Allegan and may change contaminant trends observed in various matrices.

Commenting Organization: MDEQ

Commenter:

General Comment #4: The rationale to abandon field activities after 6 months should be provided.

Commenting Organization: MDEQ

Commenter:

General Comment #5: The status of the Allegan City Dam is uncertain. The Area 5 remedy may or may not include dam removal. Based on discussions between the MDEQ and the Allegan City Department of Public Works, the water levels within the Area 5 impoundment, which are regulated by the operation of the dam, are not held constant, as the text suggests. The formation and dissolution of island complexes over time, as observed in aerial imagery, suggests that the hydrodynamic processes in the “impounded lake” area of Area 5 are temporally and spatially variable.

Commenting Organization: MDEQ

Commenter:

General Comment #6: Work Plans should be provided to the Agency’s with timeframes that allow for detailed review and discussion. The trend on the project has been to submit work plans with little or no notice, and without consideration of any formal the MDEQ’s comments or discussions with the MDEQ in Work Group meetings. For instance, many of the same

comments provided during the March 2019 Work Group meeting were provided in written format from the USEPA and MDEQ in June 2018 when reviewing and commenting on the 2018 Monitored Natural Recovery (MNR) Preliminary Sampling Plan, yet these comments remain unaddressed in the Work Plan. This has resulted in field errors, such as the recent sampling of previously excavated areas and haul roads, due to rushed nature of the Work Plan submittal and the field schedule. There issue is occurring in all Areas of Operable Unit 5 and is unacceptable.

Commenting Organization: MDEQ

Commenter:

General Comment #7: The document is entitled Surface Water Work Plan, yet the stated purpose of the work study is to provide a baseline for future comparisons in Area 6. It is the DEQs position that the LTMP, which has been ongoing for nearly 20 years, provides the baseline to which future comparisons should be made. Because natural recovery rates are generally slow, and because PCB concentrations within a given monitoring year are variable, the DEQ is concerned that reliance on unproven technology with no historic record for baseline comparisons may delay future decision making with regard to the efficacy of natural recovery as a valid remedial option. While DEQ anticipates that data from the hydrodynamic and optical sensors will provide information useful for interpreting direct measures of water column PCBs, DEQ does not endorse reliance on these indirect measures of water column PCBs for baseline comparisons intended to infer change, or rates of change in PCBs in water or sediment.

Commenting Organization: MDEQ

Commenter:

General Comment #8: The figures provided in Appendix A-1 provide little to no value. More rigorous statistical evaluations for the available dataset have been completed but are not shown.

Commenting Organization: MDEQ

Commenter:

General Comment #9: Carp removal is proposed as a potential component of the remedial action for Area 6, as well as the “impounded lake” in Area 5. In general, the long-term effectiveness of carp management and removal is dependent on removing a significant portion of carp and achieving a threshold biomass (100 kilograms per hectare), which will promote large-scale predation on carp eggs by the native fish communities (e.g. bluegill and smallmouth bass). The MDEQ believes that carp removal may benefit the overall system but recognizes that the current carp community is not well understood (i.e. age, recruitment, etc.) and the overall benefit of carp removal toward achieving remediation goals is uncertain.

Commenting Organization: MDEQ

Commenter:

General Comment #10: In addition to the lines of evidence (e.g. radioisotope analysis of sediment cores) collected during the 2018 investigation and used to approximate sediment ages and deposition rates, the contact between lacustrine sediments and terrestrial soils observed in core samples should also be utilized. Construction on Calkins Dam began in 1928 and was completed in 1935. Therefore, assuming a constant net-sedimentation rate, the contact between lacustrine sediments and terrestrial soils would represent the total deposition that occurred from 1935 to present. This may be particularly useful in cores that were collected well away from the former river channel.

Commenting Organization: MDEQ

Commenter:

General Comment #11: The Work Plan includes the installation of four Hydrodynamic and Sediment Transport (HyST) Systems (2 in Area 5 and 2 in Area 6) and two Optically-based In-Situ Characterization Systems (OPTICS) (1 in Area 5 and 1 in Area 6). The Work Plan should discuss how the limited coverage of these real-time devices inform our understanding of the larger system and how the areal extent of the data collected will be determined (i.e. does data collected at the 1 OPTICS system location in Area 6 represent the entire lake, including other “sections”?).

Commenting Organization: MDEQ

Commenter:

General Comment #12: Analyses have shown that varying the handling procedures (i.e. $\frac{1}{2}$ detection limit, “0”, etc.) for non-detect surface water samples drastically changes the rate at which PCB concentrations in surface water appear to be declining. Therefore, changes in analytical methods and detection limits, and the impact of those changes on trend analyses, needs to be carefully evaluated and discussed.

Commenting Organization: MDEQ

Commenter:

General Comment #13: As alluded to in the text, the OPTICS system may be more reliable in systems with significant and systematic short-term temporal variations in TSS and contaminant concentrations. One such example is Berry’s Creek which sees TSS and contaminant concentrations varying over intra-tidal time-scales (~6 hrs). Both vary as a function of hydrodynamic forcings (the tide), and contaminant concentrations are well correlated to TSS. Review of LTM data shows poor correlation of TSS or PCB with hydrodynamic forcings (river flow rate), and poor correlation between PCB and TSS. Therefore, and as also indicated in the text, the success of the OPTICS system is not guaranteed. Therefore, it may be more appropriate to consider implementing a short-term pilot study using this instrumentation suite in order to determine its utility for long-term and area-wide application.

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Commenting Organization: MDEQ

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Commenting Organization: MDEQ

Commenter:

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SPECIFIC COMMENTS

Commenting Organization: MDEQ

Commenter:

Section: 1.0

Page #: 1-1

Lines #:

Specific Comment #1: The Work Plan will not establish “baseline conditions” in Lake Allegan, as described in the text. Baseline conditions in Lake Allegan have already been established through the collection of data under the Long-Term Monitoring Program (LTMP), as well as additional Area-specific studies (e.g. Lake Allegan Inlet-Outlet Study, etc.), which has been ongoing since 1999. The proposed surface water sample program will measure “pre- and inter-deployment conditions” for the OPTICS and HyST systems, but the Work Plan should utilize conclusions and findings from previous investigations, produce data to *supplement* the existing

dataset, and it should not replace or be completed outside of LTMP activities. This reference, and all subsequent uses of the term “baseline” in the Work Plan should be removed and replaced with more appropriate text.

Commenting Organization: MDEQ

Commenter:

Section: 1.0

Page #: 1-1

Lines #:

Specific Comment #2: Although PCBs are the Site driver, the Work Plan should acknowledge that other contaminants were also present in the paper mill waste streams. The MDEQ believes portions of Area 5 and Area 6 are geomorphically unique relative to upstream Areas of Operable Unit 5 and acknowledges that the spatial co-location of PCBs and secondary contaminants has not been evaluated in Area 5 or Area 6 and is a data gap that will need to be addressed during the SRI/FS in each Area.

Commenting Organization: MDEQ

Commenter:

Section: 1.0

Page #: 1-1

Lines #:

Specific Comment #3: What happens if we get a high flow event and the materials being mobilized through the system are not the same as what the system was calibrated against?

Commenting Organization: MDEQ

Commenter:

Section: 1.1

Page #: 1-1

Lines #: 10

Specific Comment #4: The Explanation of Findings and Conclusions in the Opinion & Order for the Phase 2 Bench Trial, dated March 29, 2018, authored by Judge Jonker, states, in-part, *“The Court is satisfied that NCR's CCP accounts for by far the greatest volume of PCBs in the Kalamazoo River, and that any PCB contribution from other sources has had a negligible impact on investigation and cleanup costs to date. There has been no reliable showing that there was any significant contributor of PCBs to the Superfund Site other than from the paper mills.”* The statement should be revised to acknowledge that any non-paper mill sources of PCBs to the watershed are negligible compared to those from paper mill operations or be deleted.

Commenting Organization: MDEQ

Commenter:

Section: 1.1

Page #: 1-2

Lines #: 1-5

Specific Comment #5: Activities completed under the Work Plan should not be considered independent from future activities completed as part of the Supplemental Remedial Investigation and Feasibility Study (SRI/FS) process where the goal will be to determine the nature and extent of contamination and risk in Area 6. That is, data collected under the LTMP, this Work Plan (or future work plans) implemented prior to the RI/FS 2021 start date, should inform SRI/FS activities.

Commenting Organization: MDEQ

Commenter:

Section: 1.2

Page #: 1-2

Lines #: 3-4

Specific Comment #6: The MDEQ recognizes the utility of breaking down Area 5 into “two major areas of investigation”. However, the “two major areas of investigation” in Area 5 that were established (“the channelized flow reach” and “impounded lake area”) are overly broad and are not well-defined by data or site-specific measurements. The MDEQ believes the two “areas” of Area 5 may include finer resolution sub-areas where ongoing recovery processes may be unique and should be evaluated independently.

Commenting Organization: MDEQ

Commenter:

Section: 1.2 **Page #: 1-2** **Lines #: 3-4**
Specific Comment #7: The Work Plan should acknowledge that net sedimentation rates can be temporally and spatially variable.

Commenting Organization: MDEQ **Commenter:**
Section: 1.2 **Page #: 1-2** **Lines #: 16-23**
Specific Comment #8: The MDEQ recognizes the utility of breaking down Area 6 into “sections”. However, the three “sections” of Area 6 that were established (“free-flowing”, “transitional”, and “lake”) are overly broad and are not defined by data or site-specific measurements. The MDEQ believes the “sections” of Area 6 that were identified may include finer resolution sub-sections where ongoing recovery processes may be unique and should be evaluated independently.

Commenting Organization: MDEQ **Commenter:**
Section: 1.2 **Page #: 1-2** **Lines #: 25-27**
Specific Comment #9: Lake Allegan is approximately 1,600 acres in size.

Commenting Organization: MDEQ **Commenter:**
Section: 1.2 **Page #: 1-4** **Lines #: 17-21**
Specific Comment #10: Some data collected under the LTMP could be considered historic, however; the LTMP, which began in 1999, is ongoing, established baseline conditions in Lake Allegan, forms the backbone of the Area 6 Conceptual Model and should not be considered to be a *Historical Surface Water Collection Field Efforts*.

Commenting Organization: MDEQ **Commenter:**
Section: 1.3.2 **Page #: 1-5** **Lines #: 4-7**
Specific Comment #11: The description of how “sediment mixing” was evaluated and determined using a top-down video camera should be expanded to include the lines of evidence and decision process used to make that determination.

Commenting Organization: MDEQ **Commenter:**
Section: 1.3.2 **Page #: 1-5** **Lines #: 4-7**
Specific Comment #12: How was bioturbation distinguished from anthropogenic or natural abiotic disturbances?

Commenting Organization: MDEQ **Commenter:**
Section: 1.3.2 **Page #: 1-5** **Lines #: 16-20**
Specific Comment #13: What criteria/lines of evidence were used to define depositional areas?

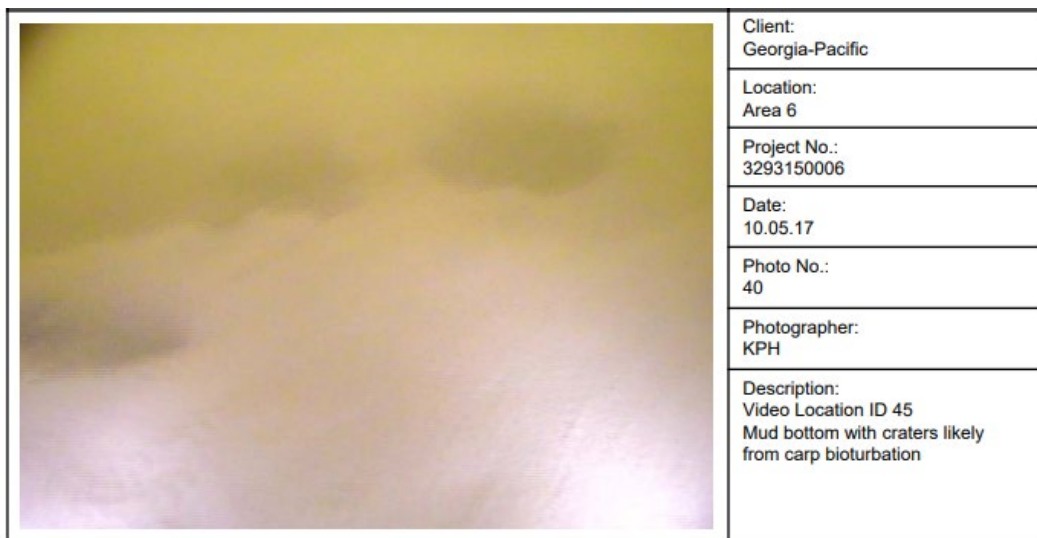
Commenting Organization: MDEQ **Commenter:**
Section: 1.3.2 **Page #: 1-5** **Lines #: 7-8**
Specific Comment #14: The “evidence of bioturbation” should be further explained. Lake-bottom environments may be more dynamic than suggested in the text. For example, in deeper lake bodies, surficial wave action is driven by wind currents but return currents moving in an opposite direction may be present deeper in the water column.

The 2017 Area 6 Video Condition Survey Report provided to the MDEQ shows what appears to be gravitational settling (loading) or perhaps *lingoid* or *lunate ripple marks*, which would be

bedform features unrelated to bioturbation, but the quality of the video is such that the identity and cause of the feature(s) cannot be determined.



19



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In 2015, the MDEQ collected images of lake-bottom sedimentary features that appear similar to those provided in the Area 6 Video Conditions Report, in a lake (Torch Lake) that is void of

carp (0 to <0.1 catch per unit effort [The Fish Community and Fishery of the Portage-Torch Lake System, Houghton County, Michigan in 2007-08, dated June 2016]) and at the exact depth referenced in the text. Those images were shared with GP via email on March 26, 2019 and are provided below.



While the identity and cause of the lake-bottom features observed in Lake Allegan is debatable the assertion that they are the result of carp feeding or other biological activities related to carp (or other bioturbating organisms) should be made with caution without additional lines of evidence to support that claim, especially if these lake-bottom features are being used to justify placement of HyST or OPTICS monitoring stations.

Commenting Organization: MDEQ
Section: 1.3.2 **Page #: 1-5**

Commenter:
Lines #: 15-20

Specific Comment #15: The bathymetry described seems to support that the two “areas” and three “sections” used to break down Area 5 and Area 6, respectively, may be overly broad and finer resolution sub-areas and sub-sections, where ongoing recovery processes may be unique, may need to be evaluated independently.

Commenting Organization: MDEQ
Section: 1.4 **Page #: 1-7**

Commenter:
Lines #: 1

Specific Comment #16: Identifying causation for changes observed in “night time” data may be difficult if not impossible in a dynamic system such as the Kalamazoo River. Please explain how results from an unknown but limited number of samples, 2-3 events are proposed in the Work Plan, collected at “night time” over a period of six months will be used to “...understand effects from nighttime bioturbation or other effects”, since this is not described in this Section or other Sections of the Work Plan.

Commenting Organization: MDEQ
Section: 1.4 **Page #: 1-7**

Commenter:
Lines #:

Specific Comment #17: The increased complexity to the investigation, and utility and quality of grain-size data generated using the Laser In-Situ Scattering and Transmissometry (LISST) compared to traditional hygrometer or ASTM sieve testing needs to be considered, since LISST data will be used to calibrate instruments and for establishing correlations, there is no apparent reason provided in the Work Plan for grain-size data in the field, LISST and other similar grain-size imaging technologies (e.g. SedImaging) have not shown to provide a significant cost savings, and other data available for comparison will have been generated using standard grain-size analytical techniques.

Commenting Organization: MDEQ
Section: 1.4 **Page #: 1-7**

Commenter:
Lines #: 6

Specific Comment #18: More is known about Area 6, and the larger river system, than what is being described. Seasonal/temporal and spatial variability of PCBs, and relationships between PCBs and water column particulates, dissolved solids, river flow and other parameters and natural phenomena, have been well documented and rigorously evaluated. Baseline conditions have already been established in Lake Allegan through the collection of data under the LTMP, which has run from 1999 to present. It is more accurate to state, “the Surface Water Work Plan will establish pre- and inter-deployment conditions for the HyST and OPTICS systems.”

Commenting Organization: MDEQ
Section: 1.4 **Page #: 1-7**

Commenter:
Lines #: 26

Specific Comment #19: Is one OPTICS system in Area 6 sufficient to detect and evaluate potential impacts to the system that can be attributed to carp?

Commenting Organization: MDEQ
Section: 1.4 **Page #: 1-11**

Commenter:
Lines #: 26

Specific Comment #20: The benefit of undertaking such a costly monitoring effort to evaluate trends and relationships that have been documented and rigorously evaluated over multiple decades, and are well understood, should be considered and the Data Quality Objectives and Study Goals should be re-evaluated.

The Data Quality Objectives, Study Goals – Decision Problems outlined in the Work Plan, and provided below, have already been evaluated.

- What PCB concentrations are associated with sediment transported into and out of Area 6 (i.e., what PCB concentrations are present in the water column)?
- Do temporal trends in surface water PCB concentrations demonstrate a decrease?
- Are PCBs predominantly present in the particulate or dissolved phase?
- What is the temporal variability of PCB concentrations in surface water transported into and out of Area 6?

Therefore, data collected for this objective will *supplement* the existing dataset and our knowledge of ongoing processes and key correlations but will not provide information on processes that are currently not well understood.

Commenting Organization: MDEQ

Commenter:

Section: 2.1

Page #: 2-1

Lines #: 15

Specific Comment #21: Please provide the rationale for selecting Bridge Road Bridge as the upstream limit for the Work Plan. The MDEQ believes the 26th Street Bridge would provide a better monitoring point for water and sediment quality flowing in to Area 5 since it marks the inlet location for Area 5 and the 26th bridge has been used as a monitoring point under the LTMP and inlet-out studies so an extensive dataset for comparison is available.

Commenting Organization: MDEQ

Commenter:

Section: 2.1

Page #: 2-2

Lines #: 6

Specific Comment #22: How will a causation for temporary shifts or changes in data collected at Station 4 be developed? The Work Plan states, data at Station 4 “...will aid in the characterization of wind-driven and anthropogenic sources of resuspension and carp bioturbation”. How will wind-driven and anthropogenic sources of resuspension or carp bioturbation, or other natural phenomena, be distinguished from one another? How will the contribution or relative contribution of each source of resuspension and bioturbation be measured?

Commenting Organization: MDEQ

Commenter:

Section: 3.3.1

Page #: 3-4

Lines #:

Specific Comment #23: According to the Work Plan, some surface water samples will not be depth integrated and will be discrete samples collected using a peristaltic pump, while other surface water samples will be collected following standard LTMP procedures (which includes depth integration and samples collected from the right bank, mid channel and left bank). The Work Plan should discuss how data collected under this Work Plan using different methods and procedures will be used and compared to each other, as well as how data collected following “new” procedures in the Work Plan will be compared with data collected under the LTMP.

Commenting Organization: MDEQ

Commenter:

Section: 3.3.2

Page #: 3-5

Lines #:

Specific Comment #24: The Work Plan should discuss how differences observed in data collected as part of the “night time” sampling effort be attributed to impacts from carp and not

other phenomena? Is the number of “night time” samples, 2-3 sample events are proposed in the Work Plan, adequate to measure and characterize what are interpreted to be “bioturbation from night-time feeding activities”, as described in the text?

Commenting Organization: MDEQ

Commenter:

Section: 3.3.3

Page #: 3-5

Lines #:

Specific Comment #25: The MDEQ has examined and evaluated the relationship between flow conditions and PCBs, as well as other parameters, and has conducted sampling during more than one storm event. Those data and correlations should be reviewed and incorporated into the Work Plan.

Commenting Organization: MDEQ

Commenter:

Section: 4.0

Page #: 4-1

Lines #: 5

Specific Comment #26: The USEPA should be notified and approve of any changes to the Work Plan prior to a change being implemented.

Commenting Organization: MDEQ

Commenter:

Section: 4.2

Page #: 4-1

Lines #: 23

Specific Comment #27: A report summarizing the field effort and results should be drafted and submitted.